CLAIMS:

1. A method for the sonoelectrochemical liquid-phase synthesis of inorganic fullerene-like (hereinafter IF) structures of metal chalcogenides, wherein said metal is selected from In, Ga, Sn and a transition metal selected from Mo, W, V, Zr, Hf, Pt, Re, Nb, Ta, Ti, Cr and Ru., and the chalcogen is S, Se or Te, the method comprising the steps of:

(a) dissolving in a suitable solvent: (i) at least one compound of said metal and at least one compound of said chalcogen, or (ii) at least one said chalcogen-containing said metal compound;

(b) immersing an electrically conductive ultrasonic probe in the solution obtained in (a);

(c) electrically connecting the ultrasonic probe, which operates as an electrode, to one terminal of an electric power supply, and the other terminal of said electric power supply is connected to a counter electrode;

(d) applying an ultrasonic signal to said ultrasonic probe electrode and an electric voltage to both the ultrasonic probe electrode and the counter electrode: and

(e) recovering the IF-metal chalcogenide structures that precipitated in step (d).

2. The method according to claim 1 wherein said suitable solvent in step (a) is aqueous or non-aqueous.

3. The method according to claim 1 or 2, wherein the synthesis is carried out at a temperature in which said solvent is in the liquid state.

4. The method according to claim 3, wherein said solvent is water and the synthesis is carried out at room temperature.

5. The method according to any one of claims 1 to 4, wherein said ultrasonic probe is Ti.

6. The method according to any one of claims 1 to 5, which comprises applying in step (d) first an electric voltage to both the ultrasonic probe electrode and the counter electrode which is then followed by an ultrasonic signal to the ultrasonic probe electrode, and repeating the sequences of electric voltage and ultrasonic signal until the desired amount of IF-metal chalcogenide structures is obtained.

7. The method according to claim 6, wherein the ultrasonic probe electrode is connected to the negative terminal of the electric power supply and the counter electrode to the positive terminal.

8. The method according to any one of claims 1 to 7, wherein the metal is a transition metal selected from Mo,W, V, Zr, Hf, Pt, Re, Nb, Ta, Ti, Cr and Ru.

9. The method according to claim 8, wherein said metal is Mo.

10. A method for the sonoelectrochemical liquid phase synthesis of inorganic fullerene-like (hereinafter IF) structures of molybdenum sulphide, comprising the steps of:

(a) dissolving in a suitable solvent: (i) at least one molybdenum compound with at least one sulphur compound, or (ii) a sulphur-containing molybdenum compound;

(b) immersing an electrically conductive ultrasonic probe in the soluion obtained in (a);

(c) electrically connecting the ultrasonic probe, which operates as an electrode, to one terminal of an electric power supply, and the other terminal of said electric power supply is connected to a counter electrode;

(d) applying an ultrasonic signal to said ultrasonic probe electrode and an electric voltage to both the ultrasonic probe electrode and the counter electrode: and

(e) recovering the molybdenum sulphide IF structures that precipitated in step (d).

11. A method according to claim 10 for room temperature sonoelectrochemical synthesis of inorganic fullerene-like (hereinafter IF) structures of molybdenum sulphide, comprising the steps of:

(a) dissolving ammonium tetrathiomolybdate in water;

(b) immersing an electrically conductive ultrasonic Ti probe in the solution obtained in (a);

(c) electrically connecting the ultrasonic probe, which operates as an electrode, to one terminal of an electric power supply, and the other terminal of said electric power supply is connected to a counter electrode;

(d) applying an ultrasonic signal to said ultrasonic probe electrode and an electric voltage to both the ultrasonic probe electrode and the counter electrode, and repeating sequentially the pulses of electric voltage and ultrasonic signal until the desired amount of molybdenum sulphide IF structures is deposited; and

(e) recovering the thus precipitated molybdenum sulphide IF structures.